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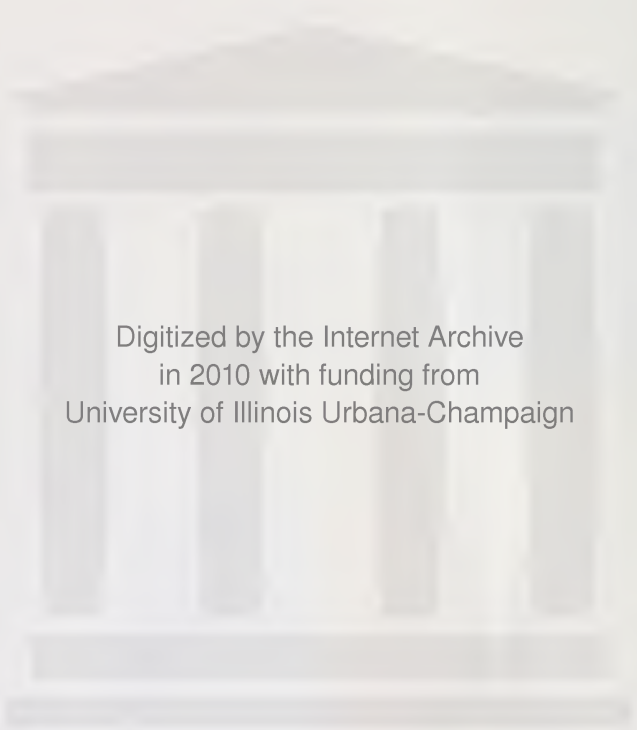
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METROPOLITAN AREA DELIMITATION: Problems and Approaches

Harold Goldstein

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METROPOLITAN AREA DELIMITATION: PROBLEMS AND APPROACHES

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It is doubtful if any two students of urbanism could come to complete agreement over a set of criteria that would logically define a metropolitan area. This lack of consensus is due, in part, to the fact that we are accustomed to areal units which only serve to differentiate places by name rather than fulfill any functional requirements. Although it is generally realized that this situation is unfortunate, the tendency to maintain traditional distinctions remains. Thus, the expanding requirements for better methods of defining and classifying areas continue to go unmet.

This paper discusses (1) the rationale for areal delimitation; (2) the historical perspective of related developments; (3) some inadequacies in the definition of the Standard Metropolitan Statistical Area (SMSA), the predominant statistical unit in use at the metropolitan level and; (4) the application of areal delimitation to neighborhood units. It also provides a thorough bibliography of related work.

WHY DELIMIT AREAS?

There is a recognized need for rational methods of areal delimitation and classification. As Greer has said: "We must emphasize the description of households, neighborhoods, local residential communities, municipalities and metropolitan political arenas, both in abstraction and in complex interaction."⁴¹ It is logical that "the choice among alternative procedures of functional classification (and areal delimitation)...be based primarily on the demonstrated greater relevance or predictive power of one classification in comparison to its alternatives...Considerations of aesthetics, simplicity, convenience, and intuitive appeal should be secondary."³⁷ "It is no longer possible to regard the city as purely an artifact..."¹³

A definitional scheme can be based upon different aspects of urbanism. We shall see, for example, that functional social units and functional economic units may be quite different. A definitional scheme may also be used for different purposes and the purpose should dictate the basis of the definition. Broadly speaking, we may use areal definitions in planning, administration and research.

Planning Needs

The planning profession, in the past, has been overly concerned with the development of a static, physical plan of the city. Relatively recent developments are causing planners to become rapidly aware of the ever widening role

they should play in shaping a dynamic urban society. No longer will ad hoc planning efforts not tied to an overall program for stable and balanced growth of a region suffice.

But a planning region is a rather complex entity which will probably vary with the particular planning application. In some cases the region will be very large; the Appalachian Regional Commission, for example, covers a thirteen state area from New York to Georgia. In other cases the region will be very small; for local educational planning it is desirable to identify functional units at the neighborhood level. The concept of the 'natural area' comes under consideration here; a spatial unit in which the population is united by certain present interrelationships to form what may be called a community. (see section entitled 'Applications to the Neighborhood'.)

Thus, for planning, a logical region should be designed with boundaries coinciding to those of the particular application under consideration. "It is apparent that... planning...can only be economical and successful where... (the geographical units used) recognize the natural organization of the city, the natural groupings of the city's population, the natural processes of the city's growth. An ideal city is not likely to be the mold of a real city."⁴¹

Webber feels that, in order to do this properly, we must first observe the manifestations of the existence of the communication networks that crisscross our cities. For,

"however invisible and intangible these networks of linkages are, they appear to me to be the important connections between the physical-location environment, systems of social organization, and the cultural and economic goals that communities seek...Linkage, conceived in the general sense, thus becomes the important basis for formulating metropolitan policies."¹⁸ He suggests that metropolitan planning deal directly with these components of spatial structure: "(1) spatial flows of information, money, people and goods; (2) locations of the physical channels and of the adapted spaces that physically house activities; and (3) locations of activity places."¹⁸ These represent "the spatial patterns of (1) human interaction, (2) physical plant and (3) activity locations...(and form) the minimal framework for metropolitan spatial planning."¹⁸ Table 1 presents Webber's view of the dimensions of spatial structure.

Process aspects		Form aspects	
I. Interaction Component (by type)	II. Physical	Component	
	A. Channels (by type)	B. Adapted Spaces (by type)	III. Activity Component (by type)
a. Amplitude	a. Capacity	a. Capacity	a. Volume
b. Focality	b. Nucleation	b. Nucleation	b. Centralization
c. Subfocality	c. Sub-Nucleation	c. Sub-Nucleation	c. Sub-Centralization
d. Intensity	d. Concentration	d. Concentration	d. Density
e. Affinity	e. Clustering	e. Clustering	e. Localization
f. Insularity	f. Separation	f. Separation	f. Segregation

TABLE 1. Dimensions of Spatial Structure¹⁸

Administrative Needs

The distinction between the natural area and the administrative area is apparent. The city is broken up into administrative units, such as the ward, the school district, the police precinct, and the health district, for purposes of administrative convenience. The object is usually to apportion either the population or the area of the city into equal units. The natural area, on the other hand, is a unit in the physical structure of the city, typified by a physical individuality and the characteristic attitudes, sentiments and interests of the people segregated within it. Administrative areas may coincide. In practise they rarely do. "Administrative lines cut across the boundaries of natural areas, ignoring their existence."⁴¹

Today there are changes in governmental structure coming about which further sharpen the need for logical jurisdictional units. The concepts behind Councils of Governments (COG's) are being recognized as "one of the more significant recent developments in local government in metropolitan areas..."¹⁸ especially in creating stronger communication links and fostering cooperation within areas. COG's, Regional Planning Agencies and similar Regional Councils are being rapidly created in just about every major city in the country. But the methods used to define such entities are generally constrained by existing boundaries, such as county lines. These artificial constructs may be

one hundred years old and cannot be assumed relevant today. If the COG idea is to offer its greatest benefits it should be based upon a rational scheme of areal definition.

Research Needs

A third consideration is the needs of researchers whose investigations require data based upon some areal unit. In order for results to be meaningful, studies of, say, social behavior often require "that the geographic area used as the frame for study or as the specific subject of the study approximate in its spatial extensions some functional ...entity..."³² That any number of types of functional entities can be conceived; social economic, physical, etc., only underscores the problem.

For research, flexibility in areal units takes on added importance. For particular projects, time trend analyses are often valuable. These require historical data which, today, are rarely suited to the analysis. Areal units have changed so often that reliable trend data are rare. A modular approach to areal definition would aid in this instance. Units should be chosen in such a manner so as to allow larger sets of units to be built up from smaller units. Thus, if an areal unit is modified, data aggregated to that unit may be reaggregated to provide an accurate historical data base for the new unit.

In serving these basic needs, those of planning, administration and research, logically conceived areal

units are useful for purely statistical reasons. "The primary objective of the SMSA has been stated to be to facilitate the utilization by all Federal statistical agencies of a uniform area for which to publish statistical data useful in analyzing metropolitan problems."³ In fact the insertion of the word 'statistical' into the older Standard Metropolitan Area term was only to maintain this stress on the definition; that the SMSA is useful for assembling tabulating and classifying data. "But statistics, to be significant, must be based not only upon accurately defined and comparable units but upon units that are actual factors in the process under examination."⁴¹ If not, their validity for application must be strongly questioned.

HISTORICAL PERSPECTIVE

It was not until the turn of the century that the Bureau of the Census first reported data on urban population by any unit other than corporate city limits. For the Decennial Census of Population in 1910, the Bureau introduced the concept of a Metropolitan District to distinguish urban population from non-urban population. "If we are to have a correct picture of the massing or concentration of population in extensive urban areas...it is necessary to establish metropolitan districts which show the magnitude of each of the principle population centers."³ This statement is somewhat misleading, however, in that it implies

that the unit was created solely as a display device rather than as a tool for one or more of the purposes cited in the previous section.

Unfortunately, the Metropolitan District did not serve as a standardized reporting tool among governmental agencies or even within the Bureau of the Census. The Census of Manufacturing was based upon the Industrial Area as a reporting device; and these did differ from Metropolitan Districts. "The usefulness of data published for any of these areas was limited by this lack of comparability."³ It was not until 1950, with the introduction of the Standard Metropolitan Area (SMA) "that a wide variety of statistical data might be presented on a uniform basis."³ Further, and much more important from a conceptual viewpoint, the SMA definition was not primarily based upon population density, rather it included criteria to determine if outlying areas were of a metropolitan character and were economically and socially integrated with the central city.

At the same time, the concept of the Metropolitan District was continued in the form of the Urbanized Area. This concept was devised to better separate urban and non-urban population in the vicinity of larger cities.

In 1960 SMSA's were established. Census warned, at this time, against the blind use of the SMSA; one should not assign to it meaning or importance greater than intended. The SMSA is, as previously stated, primarily a statistical device.

The Bureau of the Budget, which actually has the job of creating areal definitions, has also defined Urban Regions. These are based on population and density criteria with the county as the basic building block. However "portions of counties with extremely low population densities are not included (in an Urban Region)."³⁹ One of the major criticisms of the SMSA definition is that it is constrained to use the entire county as its building block (except in New England where the absence of counties has forced the use of an alternate, but similar, system). It appears that the county boundary, which usually has not been altered since its inception, does not often delimit a meaningful area, and perhaps never has. The Urban Region definition presents a possible alternative to the blind use of the county line.

Also in use today is the Urban Place, seen as being, simply, a population cluster. There are both incorporated and unincorporated places. The Urban Place for an incorporated city or town follows its municipal boundary.

SOME PROBLEMS WITH TODAY'S DEFINITIONS

There is much additional criticism of the criteria used to delimit SMSA's. Unfortunately these criticisms have dealt mainly with specific numbers rather than with concepts. It is irrelevant that some think the 50,000 lower limit on the population of the SMSA central city is too low and some think it is too high. What is important,

at this time, is the fact that there is a definite cutoff point and discussion should focus on whether or not this is valid as a definitional concept. However there have been no esoteric discussions of the validity of such a lower limit. Note that this criterion may be viewed as a determinant of a minimum level of communication before a city qualified as truly urban, and be justified in this way.

In addition to population criteria, there are criteria of metropolitan character and criteria of integration. The former deal with the enunciation of principles which will allow ready differentiation between metropolitan and non-metropolitan areas; the latter deal with the degree to which the surrounding areas are tied to the central city and county of the SMSA. These criteria are based upon general concepts and though they have been translated to specific definitions, the translations are not universally viewed as adequate.

Over twenty years ago Klove felt that we were "not yet clear in our thinking as to the essential characteristics of a metropolitan area."²² Today there is only "vague and uncertain understanding of the meaning of this concept."³ Obviously if one cannot describe the general characteristics of a metropolitan area in a clear and concise manner, then the job of creating specific criteria is hopeless. Metropolitan criteria for the SMSA deal primarily with the composition of the working force; more specifically, metropolitan

counties are identified as those with a relatively high concentration of non-agricultural workers. This can be viewed as a constraint on the type of communication prevalent in the affairs of the urban entity.

Meier suggests that metropolitan character, which he refers to as urbanity, relates to the interactions that occur within an area. His feeling is that the variety generated within an urban society may be used to construct an index of urbanity. An examination, then, of the distribution of the use of time should provide some clues. Meier feels that "a high degree of urbanity develops where citizens are receptive to international and cosmopolitan values, they are somewhat more nationalistic than the average, and tolerate or encourage provincialism, but would repress parochialism, nepotism and outright self-serving."¹⁶

Although the concept of integration of the outlying counties is a bit clearer than that of metropolitan character, there are still many problems involved. Present criteria are based entirely upon commutation characteristics. This might well be interpreted as a measure of suburban--central city interaction. But such statistics do not reflect factors such as economic or social integration, industrial linkage, physical similarity, etc. For that matter, the importance of geographical contiguity has not been established.

These and other problems with present methods of areal definition have led to proposals for the establishment of new systems.

POSSIBLE ALTERNATES

There is no lack of alternate schemes of areal delimitation methods at the metropolitan level. These range from the slight modification of present SMSA definitions to some original and conceptually based ideas. Some of these are briefly described.

Metropolitan Dominance

Bogue set forth a rather unique and simple scheme in which he arbitrarily selected 67 metropolitan communities and assigned them their hinterlands with distance as the sole criterion.⁶ All of the land area of the country was then theoretically part of one of the defined communities. His purpose, it must be mentioned, was to show how the metropolis dominated the living patterns of the country and, thus, his is not meant to be a serious attempt to establish a new definitional scheme.

However the idea of using distance as a criterion for delimitation does have merit; it is unfortunate that it has not been well explored. Note that distance does not have to be solely a function of miles but can be a function of minutes and dollars as well. Bogue notes how the influence of the automobile would have negated the significance of any definitional scheme that preceded its widespread use.⁶ However, if the distance concept were based on time and monetary measures, as well as absolute distance, this limitation might not be binding. In communication terms, distance may be viewed as a resistance to interaction.

Distance in any terms should not be the sole determinant of metropolitan dominance. Others have explored the social²⁶ and economic dominance of a central city in determining its hinterland.

Urban Field---Urban Community of Interest Area

The Urban Community of Interest Area (UCIA) concept calls for a new unit "which is defined on the basis of generalized areal spheres within which immediate ties of families and communities can be identified."³ The assumption is that a regular pattern of activity can be mapped and used for areal definition. The authors of this idea thought of the UCIA as a small area differentiated by its social and economic patterns. But the idea could have greater application if the interests of the overall metropolitan community were considered. Friedmann and Miller were thinking along these lines when they introduced the Urban Field. This they view "as an enlargement of the space for urban living that extends far beyond the boundaries of existing metropolitan areas...Eventually the Urban Field may even come to be acknowledged as a community of shared interests...They will be shared because to a large extent they will overlap and complement each other within a specific locational matrix."¹³

These two concepts can be viewed as direct responses to Webber's call for a new view of the city; that we speak in terms of dynamic interrelationships instead of static

spatial entities. But there is no easy way to further develop these concepts. The linkages and interactions they involve must be identified and analyzed and this can be accomplished only "by empirically observing their manifestations."¹⁸ Webber suggests that, initially at least, the obvious manifestations be recorded, "flows of information, money, people, and goods"¹⁸ and that patterns and intensities of interactions be identified through these measurements.

Unfortunately, most articles which suggest new ideas tend to be theoretical discussions and contain little in the way of concrete suggestions. Thus the Urban Field is presented as a rather mystical device which, "for the family...offers a far greater choice of living environments than do the old metropolitan areas"¹³ etc. Instead of suggesting how the Urban Field might be constructed, the authors spent their time in writing a utopian article with little of interest other than their initial concept.

The Functional Economic Area

Fox and others¹² are investigating Functional Economic Areas (FEA's) based on county-to-county commuting data. Although, for practical purposes, defined on a county basis, the FEA is conceptualized as consisting of a central city and a set of surrounding cities and towns which taken together form a relatively independent unit in terms of local services to adjacent populations. The conceptualization

implies, as does the UCIA scheme, that functional social areas and functional economic areas are very similar. This is not generally held to be true. It is unreasonable, it is argued, to expect a single definitional scheme to effectively come to grips with complex social and economic forces at the same time. This major conceptual issue is of importance and should be resolved before any attempt at a significant revision in the SMSA concept.

FEA's may be combined to form a Consolidated Urban Region (CUR) if there is significant cross commuting. Berry, et al have proposed a system for defining a consistent set of CUR's and FEA's.³ A number of variations to the basic definitions are possible. These involve varying the threshold populations, even so far as to exhaust the area of the country; this could be used as a means of evaluating the theoretical validity of a threshold population.

Bogue's Regional Limits

I've already alluded to the problem of creating a single definitional scheme when, in actuality, numerous complex and possibly uncorrelated forces may be at work. One dichotomy, that between a social and an economic classification has already been mentioned. Bogue suggests a different dichotomy; he would create one set of areas to indicate units with significant daily contact and a second set of areas for units with broader dependence on the central city. This again has great relevance to Webber's ideas regarding the dynamics of the urban entity.

The criteria suggested for defining these areas make use of the following:⁷ for daily interaction: -daily newspaper service, -buses and trains for commuters, -% commuting to city, -dep't. store deliveries, -distribution of checking accounts, -commuting distance, -% workers in city from outlying area; for general influences: -where farmers sell truckload lots, -Sunday newspaper circulation, -where people go to get specialized goods, -ratio dep't. store charge accounts, -migration of high school grads for work, -wholesale trade areas, -farm machinery service areas, -frequency of bus travel to city, -volume of long distance phone calls.

These criteria seem to be more relevant than those generally used to identify homogeneous and intertwining areal units. Note that practically all of these items may be viewed as direct measures of communication between an outlying area and a central city, and the others may be interpreted as indirect communication links. To this author's knowledge this line of attack has not been followed up upon in the nearly 20 years since it was suggested.

Other Potential Criteria

Thomlinson, in an overly simplistic exposition of urban structure suggests 16 criterion functions for identifying cities.³⁸ (1) Minimum population, (2) Population density, (3) Historical criteria, (4) Administrative law, (5) The exterior aspect (i.e. physically built up? ..or not?),

(6) Type and mode of life, (7) Occupational types, (8) Commercial character, (9) Industry, (10) Dependent nature of cities, (11) A central place for transportation, (12) Commuting, (13) Government or religious functions, (14) Cities have a central focal point, (15) Diversity, (16) a) a large agglomeration of people in a contiguous built up area, b) who produce non-agricultural goods and services, c) and have an urban life style.

Thomlinson makes no attempt to satisfy, or even recognize, the conceptual problems mentioned, but his list neatly ties up most criteria used by schemes of areal delimitation that have been proposed or put into operation.

APPLICATION TO THE NEIGHBORHOOD

Thus far, discussion has been limited to areal delimitation at the metropolitan level. As important, or perhaps more so, is the identification of meaningful neighborhood units within a city. A major complaint leveled against present governmental practises concerns the bureaucratic layers that have formed between the citizen and the decision maker. A trend has appeared that would allow local area planning to cut through these layers. As an example consider the Model Cities Program of the Department of Housing and Urban Development (HUD). For this program, cities have chosen neighborhood units, to be designated as Model City Areas, for participation in small area planning

with direct resident involvement. It would appear desirable for the Model City Area to be one which may be considered as an integrated neighborhood unit. Without making a strict definition of this concept suffice it to say that such an area would be relatively homogeneous and significantly different from adjacent neighborhoods.

The methods used to develop such areas for the Model Cities Program were usually ad hoc random selection procedures, or effectively so. In some cases, natural boundaries, such as freight railroad tracks, which tend to create real differences between areas, were ignored. It is possible that a better integrated neighborhood unit might have increased the level and intensity of direct participation.

Shevky and Bell have used three types of variables--economic characteristics, ethnic characteristics, and family characteristics--to create a dichotomy consisting of 32 possible types of social areas.² This typology, or one similar to it, could be used as a means of small delimitation. Shevky and Bell claim that the social area generally contains persons having the same level of living, the same way of life, and the same ethnic background; the hypothesis being that persons living in a particular type of social area would systematically differ with respect to characteristic attitudes and behaviors from persons living in another type of social area.

"The mere delineation of these subareas for a city, and the precision with which it is accomplished by this method, should be of descriptive value to the social scientist and city planner alike."³⁵ Although I tend to think that the case might have been stated a bit strongly, and that statistical quirks can be misleading, Social Area Analysis can be of value especially when used in conjunction with some of the methods mentioned below. To this author's knowledge, this has not been done.

A different approach would be to determine what individuals themselves perceive to be their neighborhood. Lynch, in a very significant study, tried this on a large scale in three major American cities.²³ He theorized that an environmental image may consist of an identity component, a structure component, and a meaning component. In an attempt to learn the role that such an image plays in our life, he interviewed people in Los Angeles, Boston and Newark to determine their perception of the city in which they lived. Although he was working on the metropolitan scale, he did learn how people perceive small areas within the city. His purposes, however, were not similar to those we might have and so its not relevant to dwell in any detail on his conclusions. It is important to mention that the methodology used, and in specific the idea of asking people themselves what their neighborhood unit is, is of significance.

This theme was further examined by a number of people, one of whom was Laurence Ross.³³ Ross determined, to his own satisfaction, that a city does consist of named areas which are bounded by identifiable barriers. Although he presents no conclusions concerning the validity of considering the named area as a community, to do so would appear logical. Ross's results, however, can not be really generalized by themselves. Boston was used as a laboratory, and since Boston is a city with a high degree of imageability (i.e. an area such as Beacon Hill is very readily identified) to generalize on this basis would be very dangerous.

But it is logical to expect that if neighborhoods could be identified, they would serve well as a basis for local planning. Further, such areas would be of extreme usefulness for research purposes. It has already been pointed out that for any study to be effective it is important "that the geographic area used as the frame for study or as the specific object of the study approximate in its spatial extensions some functional...entity..."³²

RESEARCH INTO METROPOLITAN STRUCTURE

The literature on the broad topic of metropolitan structure is very large and although much of the material is not directly pertinent to definitional questions, many of the conceptual issues involved are similar. Perhaps the most extensive study on American cities was done by Hadden and Bogatta.¹⁷ Their review of classificatory schemes based

on historical, functional, economic and factor analytic methodologies is most comprehensive and their criticisms of past studies are quite keen. It seems that "classification tends to be an end in itself rather than a means to an end."¹⁷ Duncan echoes this complaint; "the purposes for which functional classifications are designed are seldom made explicit, and often-times little is done with them after they are finished...there is little need for just another functional classification of cities, however ingenious its methodology."¹⁷ Few recognize this as true, fewer listen to its message. Wilkinson, for example, merely asserts that "the usefulness of functional categorization of urban units requires little if any justification..."¹⁷

Hadden and Bogatta are themselves as guilty as others. In answering critics questioning the validity of drawing conclusions from factor analytic studies, they note that there are no magical claims made by persons applying factor analysis; that extravagant claims for the technique tend to appear in the informal comments of critics. They then use this as justification (or, more accurately, as a rational for not having justification) and go right ahead and prepare a 'profile of cities' that appears to be as useless as any other classification except in that it provides a neat way of systematizing data.

In their study, an argument for the development of empirically stable concepts is developed. They neglect to

consider that the nature of the classificatory problem negates the validity of such a concept. In times of rapid growth and change it is doubtful if a single classificatory scheme can retain its usefulness for more than one generation.

An interesting sidelight to their study is that data for SMSA's, central cities, and urbanized areas show exceedingly high correlations. This implies that these definitional constructs tend to measure the same basic entities. A similar result was obtained through a nearest neighbor analysis by Cypré, Fitzgerald and Goldstein.⁸

Other studies provide similar interesting tidbits, but little in the way of definite aid in the definitional problems mentioned. Maloney wanted to obtain an understanding of the characteristics unique to an area and took a much used approach; he gathered together 'n' variables, did a factor analysis and named the factors with some original descriptive terms (i.e. southern syndrome, sporadic employment, etc.).²⁴ King did a similar study for Canadian cities and came out with somewhat different factors.²¹ Moser and Scott did the same for British towns,²⁷... the list goes on and on. Those interested in seeing such classificatory schemes and the results of such factor analyses are referred to the literature cited, and especially the Hadden-Bogatta study.

Berry Commuting Study

A study of interest to the proposed effort was one undertaken at the University of Chicago by Brian J. L. Berry and his associates. The study consisted of "an examination of existing principles of area classification for Standard Metropolitan Statistical Areas, and an examination of alternate criteria...in order to formulate new principles of area classification which will provide area designations which are most useful and meaningful...(The study examined) the effect of applying alternate criteria of integration of central cities and their outlying areas in the delineation of Standard Metropolitan Statistical Areas,...(and used these results to) classify the entire United States into a hierarchy of urban, metropolitan and consolidated areas..."³

The report of this study includes a discussion of the SMSA definition as it read prior to 1970 (it is essentially the same today), the criteria used and the criticisms it has drawn. The discussion focuses upon the fact that there is inadequate understanding of the concepts used and does not deal with numerical trivialities. Alternate schemes that have been proposed are presented, some of which have been discussed in a previous section of this chapter.

The body of the study involved an examination of the commuting fields of every SMSA in the country. The immediate result was startling: "the data reveal marked discontinuities (in the commuting field) along political boundaries,...(and

such discontinuities) appeared in every commuting field studied in the United States--in larger cities and smaller ones, in industrial areas and agricultural areas, in areas with natural boundaries and those with artificial boundaries. There...(were) no exceptions."³ This finding would imply that our present political boundaries are much more meaningful than I have implied, but closer examination of the data revealed a number of inconsistencies and the study concluded that these results (i.e. the discontinuities) were primarily caused by a series of systematic biases built into the data.

The study did find that the hinterland of the central city is generally more extensive than the defined SMSA, and it did suggest usage of the entire commuting field in place of the present criteria (which require 15% of the work force of a peripheral county commute to the central city or 25% of those working in the peripheral county commute from the central city). The study proposed a hierarchy of definitions in which the FEA, as has been discussed, would serve as the basic metropolitan unit. The study itself did little, however, to provide answers to the conceptual issues it raised, or to shed light on the meaning of 'metropolitan character'.

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Index to the Bibliography

- Areal Delimitation, Concepts of...3, 14, 25, A18
 - alternates for metropolitan delimitation...3, 7, 11, 12, 13
 - delimitation of urban hinterland...3, 15, 30, A8, A9
 - delimitation of urban sub-areas...9, 10, 20, 32, 34, 41, 42
 - on the COG...18
 - on the SUSA...22, 36, 39
 - perception of boundaries...23, 33
- Classification of Urban Areas, Overview of...17
 - factor analytic...17, 21, 27, 28, 31
 - functional...19, 37, 40
 - other...A3
- Dimensions of Urban Description...1, 5, 8, 16, 17, 24, A3
- Political Integration, Concepts of...A4, A5, A14, A15, A19
- Social Area Analysis, Discussion of...A2, A10, A12
 - studies...2, 35, A1, A13
- Transaction Analysis...A5, A6, A7, A9, A17
- Urban Structure, Discussion of...4, 6, 25, 26, 29, 38, A11, A16, A18

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